SPATIAL ECONOMETRIC ANALYSIS OF POVERTY IN NORTHERN HUNGARY BETWEEN 2000 AND 2010[1]

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Abstract

In Northern Hungary, poverty is a big issue not only in country, but also in European context. Both headcount index and poverty gap ratio excess Hungarian and European average. As these regions are economically backward, too, the study examines whether economic growth (or recession) has an effect on poverty and if so, what kind of effect it is. The results show that economic growth has no impact on poverty rate and gap ratio. The economic growth of the neighbouring areas can decrease only the headcount index.

Key words: poverty; economic growth; economic crisis

1. INTRODUCTION

Even though information about the social effects of the global economic crisis started in October 2008 is limited, it is sure that economic recession, the decrease of real salary levels and the significant decrease of the number of workplaces have rendered the life of many people more difficult. Changes in economic and social roles have accelerated, which affects the individuals' behaviour. Most of the individuals are able to adapt themselves to the changing roles, but there are some who cannot either because of their inherited cultural norms or because of their lifestyle. They are the ones who are most endangered by poverty and social exclusion.

The study examines how recent economic crisis and the related unfavourable economic features affect poverty. As economic crisis goes together with economic recession, I am trying to determine to what extent it influences poverty. The paper is trying to prove that economic recession contributes not only to the impoverishment of an important portion of the society, but also increases the depth of poverty significantly. If I fail to reject this, it is worth examining to what extent one percent economic growth or economic decline can decrease or increase the rate of the poor and the depth of poverty. Besides the effect of the economic growth of the given area, the paper also analyses the effect of the economic growth of the neighbouring areas. The initial hypothesis states that the economic growth of the neighbouring regions can also alleviate poverty.

The study examines Northern Hungary, one of the most backward regions in Hungary (based on GDP per capita). Eurostat reports this region is among the poorest twenty regions within the European Union (based on GDP per capita PPP, it is the 259th among the 271 regions of the European Union).

2. POVERTY

There is no exclusive definition for poverty. According to the most general definition, one is considered to be poor if (s)he does not have the minimal amount of money necessary to make ends meet, that is his/her income does not exceed a minimal level (Bokor 1987).

Four main conceptions of poverty are distinguished in the poverty literature (refer to table 1). Absolute concepts of poverty assume that minimum material needs can be defined regardless of space and time. Those who are not able to satisfy these needs are considered to be poor. The relative conceptions define poverty as being below some relative poverty threshold. People can be considered to be poor if they fall behind some average wealth level of the society to a certain extent (for example 50 or 60 percent of mean or median income level). The other approach using the relative poverty concept defines poverty line as an income level below which a certain part (one tenth or one fifth) of the population lives (Hegedűs and Monostori 2005).

Subjective well-being can be reflected by the so-called subjective poverty concept. This concept was elaborated by two research groups. Van Praag (1971) worked out the Income Evaluation Question (IEQ) to collect data on subjective well-being. Deleeck and his stuff defined CSP (Subjective Poverty Line). Subjective poverty concept can be used in two ways. On the one hand, poverty can be defined by examining who people consider to be poor. It can also be defined by collecting peoples' beliefs about their own position in a system of inequalities (Spéder 2002).

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Besides its monetary definition, there are multidimensional concepts of poverty as well. In this sense, deprived is the person who is in an unfavourable position from different views, so handicaps are accumulated. Accumulated poverty and social exclusion are, however, not exactly the same things. In the case of accumulated poverty, emphasis is put on the output, namely on the deprivation from certain goods and services. Exclusion, however, primarily focuses on the process leading to poverty (Havasi 2002). Complex view of poverty is important because deprivation is much more widespread if more dimensions are taken into consideration rather than define poverty by only one dimension (Bokor 1987).

Table 1 Concepts of poverty

Concept of poverty	***Income***	***Living conditions***
Absolute	Subsistence level	Not pocessing certain items
	Regional minimum	Being in crisis
Relative	Living below the 50 or 60 percent of mean or median income	Deprivation index
	Lower decile, quintile	
Subjective	Subjective poverty	Minimal living conditions

Source: own compilation based on Spéder (2002, p 53).

The European Union (EU) elaborated the system of Laeken indicators in 2001, which defines several, mainly relative, measures of poverty. Its application makes it possible to compare different level NUTS regions. The paper applies the most common measure of poverty defined by EU using the 60 percent of median income.
Using poverty line, the most important measures of poverty can be defined. The most common measure is the headcount index (H) that expresses the ratio of those living below the poverty line in the whole population (Ravallion 1996).

$$H = \frac{p}{n}, \tag{1}$$

where p is the number of persons living below the poverty line and n is the number of population. This measure describes the extent of poverty. It does not give any information, however, about the depth of poverty. If the financial conditions of a poor person worsen, the value of the poverty rate will not change at all.
That is why it is worth computing poverty gap as well, that measures the distance between the average income of the poor and the poverty line. In order to make it suitable to measure changes over time and space, this measure can be expressed as a percentage of the poverty line (this is the so called poverty gap ratio (PG)).

$$PG = \frac{1}{p}\sum_{i=1}^{p}\frac{g_i}{z}, \tag{2}$$

where g_i's are the poverty gaps and z is the poverty line (Hajdú 1997).

3. THE EFFECT OF ECONOMIC GROWTH ON POVERTY

Economists have long been debating about the relationship between economic growth and poverty. It is not known exactly how economic growth affects the conditions of the poor. It is obvious that faster economic growth goes together with faster poverty reduction, but experts have long been debating about the exact nature of the relationship between these two factors. If economic growth can significantly reduce poverty, strategies relying on economic growth to reduce poverty are probably justified (Bourguignon 2002).
In the 1970s many economists believed that economic growth is not enough to reduce poverty. In 1974, Chenerey and his staff (1974) found that growth has benefit only to two persons out of three. Adelman and Morris (1973) had similar opinion. They said that economic growth reduces the income of the poor in absolute and relative terms as well. In this way those who live in extreme poverty were rather hurt than helped by economic development. Ravallion (2009) drew the same conclusion. By analysing 100 developing countries, he found out that conditional

convergence, i.e. the growing advantage of starting from a lower development level, cannot be realized because of the high poverty rate.

In the evaluation of the theories about the relationship between poverty and economic growth, Kuznets (1955) and his hypothesis played an important role. It says that the two variables are related in an inverted U-shaped curve. It means that in the early stages of economic growth, income distribution worsens and it does not improve until countries reach middle-income status. At the beginning of economic growth income inequalities increase, which does not allow the improvement of the poor's conditions. Kuznets hypothesis was based on data derived from cross-sectional data and on theory. Later, economists started to use time series besides cross-sectional data to characterize that relationship (similar research was carried out by Ravallion; Deininger and Squire; Schultz; Brno, Ravallion and Squire). All of these more recent studies tend to reject the Kuznets hypothesis. Empirical findings showed that economic development does not have any significant impact on income distribution (Adams 2003). Deininger and Squire (1996) found several countries where per capita gross domestic product (GDP) increased significantly while the value of Gini coefficients which is used to measure income inequalities hardly changed at all.

Later some new findings appeared that supposed a significant relationship between poverty and economic development. According to Dollar and Kray (2001), the average income of the poorest part of the society increases proportionately with average incomes. Their statement was based on an empirical research based on data from 92 countries for four decades. If we use the absolute concept of poverty – which supposes that the minimal need can be defined irrespectively of time and place and those who cannot satisfy these needs are considered to be poor – than let us suppose that economic development tends to improve the conditions of the poor as well. After a while – even without redistribution – they can cross the poverty line and get out of poverty. To some, it is suggested that "trickle down" can solve the problem in due course. In case of a developing country, however, it takes more than twenty years to be lifted out of poverty (Kanbur 1987). Adams (2003) carried out a research based on 50 countries and found that economic development reduced poverty significantly as it has little or no impact on income inequality.

A research examining Northern Hungary between 2000 and 2007 concluded that economic growth can reduce significantly poverty rate and poverty gap where poverty was defined based on the existence minimum (Siposné Nándori 2009). This research, however, did not take into account the effect of the economic growth of the neighbouring regions, nor controlled for the differences in human development.

On the basis of this study and that of Adams (2003), I hypothesise that economic growth can reduce the headcount index and the depth of poverty at the same time in Northern Hungary. Moreover, I hypothesise that spatial autocorrelation is significant in Northern Hungary, i.e. the economic growth of the surrounding areas can also decrease the headcount index and the poverty gap ratio.

4. METHODOLOGY

The effect of economic growth on poverty can be described by graphs and regression analysis. Graphs can help in determining the trend of this effect. In order to describe the nature of the relationship between economic growth and poverty exactly, the method of regression analysis is used. Poverty at country i at time t can be expressed in the following way (Ravallion-Chen 1996):

$$\lg P_{it} = \alpha_i + \beta \cdot \lg \mu_{it} + \gamma \cdot t + \varepsilon_{it} - \beta \cdot v_{it} \qquad (3)$$

where P is the measure of poverty in country i at time t, μ_{it} is the measure of economic growth, α_i is a fixed effect reflecting time differences between countries in distribution, β is the growth elasticity of poverty with respect to the given measure of economic growth given by μ_{it}^*, γ is trend rate of change over time t and ε_{it} is a white-noise error term that includes error in the poverty measure. This model ignores every other factor that can influence the relationship between economic growth and poverty. That is why the following extended form of this model is used in the further analysis:

$$\lg P_{it} = \alpha + \beta_1 \cdot \mu_{it} + \beta_2 \cdot EDUC_{it} + \beta_3 \cdot REG_{it} + \varepsilon_{it} \qquad (4)$$

where P is the poverty measure (headcount index or poverty gap ratio) in county i at time t. The model contains three explanatory variables: μ_{it} as the measure of economic growth (per capita real GDP or per capita real income), EDUC, the rate of secondary school students in the whole population and REG as the measure (the average level of the GDP of surrounding counties). α is the constant term, β_1 expresses the economic elasticity of poverty, β_2 provides information about the effect of human development on poverty and β_3 provides information about the effect of spatial autocorrelation on poverty. Including REG and EDUC variables in the model makes it possible to control for the different levels of human development and spatial autocorrelation among the counties.

Taking into account the availability of the data, the regression analysis can be carried out for the period 2000-2010 (data for the headcount index are available only from 2003). For this time period data for the three counties of the Northern Hungarian region (Borsod-Abaúj-Zemplén, Heves and Nógrád) are available therefore a panel data base is used for the analysis. The optimal regression function is determined using panel regression. There are many ways we can estimate the above regression with panel analysis. I assume that the constants are all constant, so the method called "fixed effects" is applied, which is named in this way because of the fixed constants assumption. By subtracting the overall means from X and Y in the regression equation, the constant terms can be eliminated. The analysis is carried out in Getl.

Data about income levels are derived from the personal income tax returns of the Northern Hungarian Regional Directorates of the National Tax and Customs Administration of Hungary. Even if data can include biases (like hidden income, income from the black economy), the analysis is carried out using these data because of the lack of more reliable data sources. These data are used to calculate the poverty measures. Data about the rate of secondary school students are from the database of Hungarian Central Statistical Office. Data about surrounding counties outside the country are derived from the database of Eurostat and IMF.

Measuring economic growth is possible in several ways. Per capita GDP on purchasing power parity or per capita average income / average consumption are usually used to measure economic growth (in poverty analysis, per capita income or per capita consumption are used as a measure of economic growth by Kuznets (1955), Kanbur (1987), Kakwani (1993), Ravallion and Chen (1996), Bourguignon (2002). Per capita real GDP or GNI is used by Cashin (1995), Collier and Dollar (1999) and both measures are used by Adams (2003)). These two kinds of measures do not often agree. Differences are the result of the different definitions of the two measures. Average income and average consumption values come from household surveys, so they are usually highly correlated with household expenses. Per capita GDP and GNI values, however, are derived from national accounts, where household expenses are residuals. So any errors or omitted items in national accounts result in the deviation of household expenses. Measuring average income or average consumption can also have different results. People usually are not very keen on talking about their income and they tend to reject answering the questions related to their income level. According to a study made at the beginning of 1990s in Eastern Europe, average consumption level exceeds average income level in 82% of the cases (Milanovic, 1998). Many economists believe that data derived from national accounts are more accurate than the results of a representative survey, but Daeton (2001) believes that this is without any basis.

In the analysis, real GDP per capita derived from national accounts and per capita real income levels are used (published by the Hungarian Central Statistical Office) to measure economic growth. The current GDP and income values are compensated for changes in the value of money using the inflation rate to get values that expresses the real change.

5. RESULTS

5.1. Income level

To get a closer view of monetary poverty, it is worth examining the net income level and the change in income in the case of the counties of interest (figure 1). Increase in income between 2007 and 2010 was the highest in Heves county (21,79%), while it was the lowest in Nógrád county (which is in fact a decrease in real income levels).

The income level of 2010 is defined controlling for the effect of inflation. The lowest value can be found in Nógrád county, while Heves county is characterized by the highest value. The joint analysis of the two variables highlights that Nógrád county is in the most unfavourable condition from economic point of view, as both income level and change in income are low there. Based on income level, Heves county is in a favourable condition at least comparing to other part of the region. The net income level, however, is still lower than the national average. Borsod-Abaúj-Zemplén county has a middle position out of the counties of Northern Hungary.

5.2. Poverty

The values of the headcount index (figure 2) exceed the Hungarian and the EU average in all counties of the Northern Hungarian region. The three counties follow the same trend. The headcount index of the three counties decreased from 2003 to 2007 (with an exception of the increase in 2006). The difference between regional data and Hungarian or EU data, however, increased from 2008 to 2010. Within the region, the headcount index is the highest in Nógrád county, while Heves county is in the best position where the headcount index was less than 22 percent in 2008 (no other counties reached this value in the examined regions).

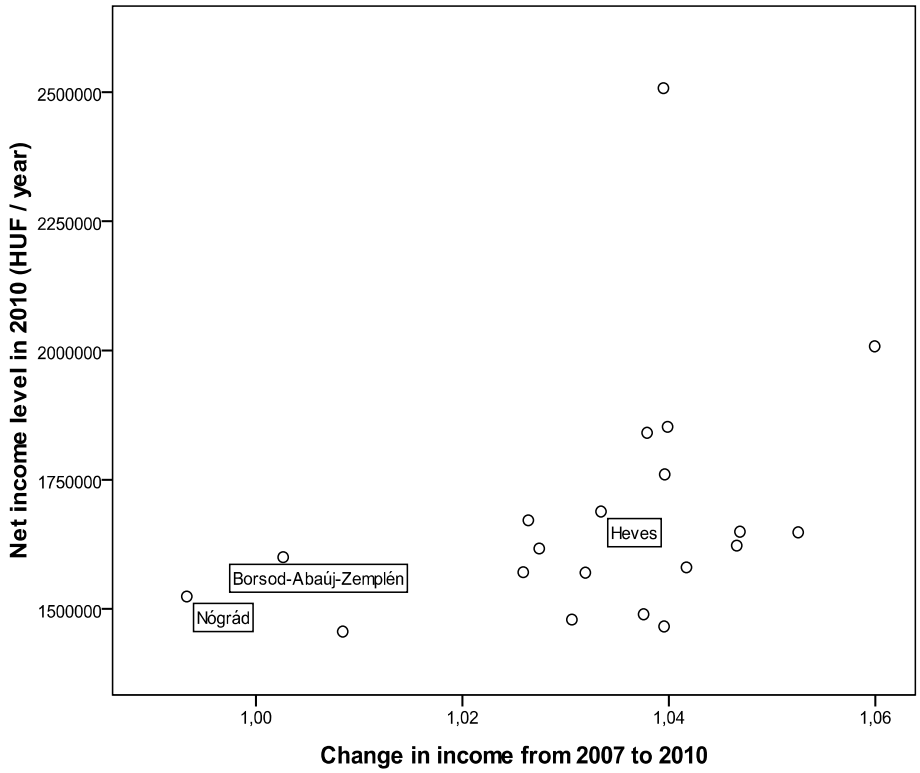

Figure 1: Distribution of counties in Hungary by change in income from 2000 to 2008 and by net income level in 2008

Source: own compilation based on the database of National Tax and Customs Administration of Hungary

Poverty gap ratio (figure 3) did not increase significantly. Moreover, at the second half of the examined period, it slightly decreased. It implies that the depth of poverty did not increase up to 2010 due to the economic crisis. The reason can be a delayed effect.

The economic crisis first decreased production and output level. Social problems, like the increase of unemployment rate appeared later. Industrial production decreased in March 2008, while the number of job seekers only slightly increased in the first phase of the crisis between October 2008 and January 2009. A significant increase in the number of job-seekers started only after January 2009. (Lőcsei 2010) Changes in poverty gap ratio probably follow the changes of the unemployment rate. The backward of the regions under study from the Hungarian and European average is apparent in the case of poverty gap ratio as well.

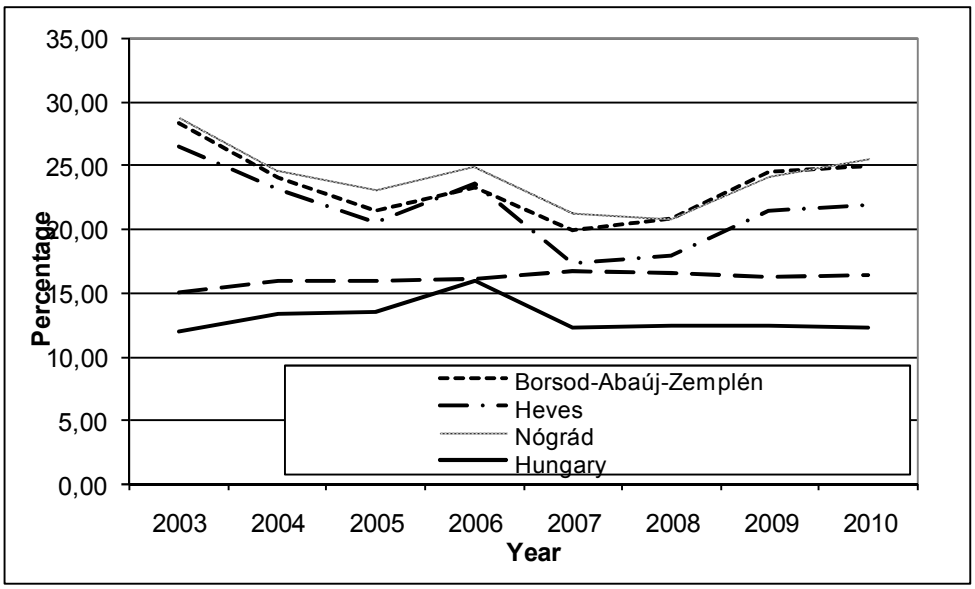

Figure 2: Headcount index, 2003-2010

Source: own compilation based on the database of APEH and Eurostat (Values of the European Union refer to 15 counties before 2003, to 25 counties between 2004 and 2006 and to 27 counties from 2007. The source of the poverty rate in Hungary for 2004: Vukovich (2008) p 14.)

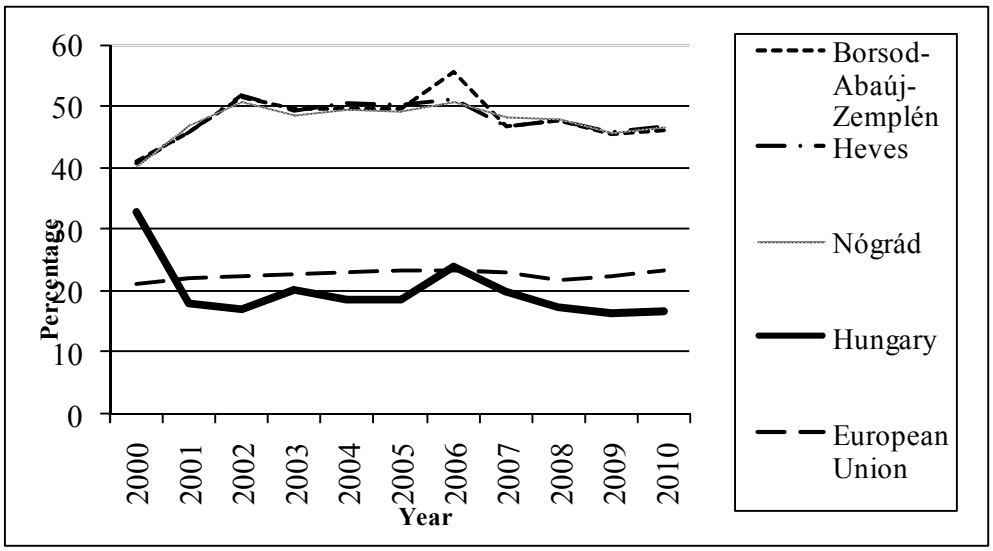

Figure 3: Poverty gap ratio, 2000-2010

Source: own compilation based on the database of APEH and Eurostat (values of the European Union refer to 15 counties before 2003, to 25 counties between 2004 and 2006 and to 27 counties from 2007. The source of the poverty gap in Hungary for 2004: Társadalmi Kirekesztés Elleni Bizottság (2006): Helyzetelemzés a Szociális védelemről és társadalmi összetartozásról szóló Nemzeti Stratégiai Jelentés c. dokumentum 1. fejezetéhez)

5.3. The effect of economic growth on poverty

Graphs can help to determine the trend of the effect of economic growth on poverty. In determining the direction of the relationship between per capita real GDP and poverty headcount index, we can conclude that two third of the observations (14 out of the 21) can be found in the upper right and lower left quarters, which illustrate a positive relationship (figure 4).

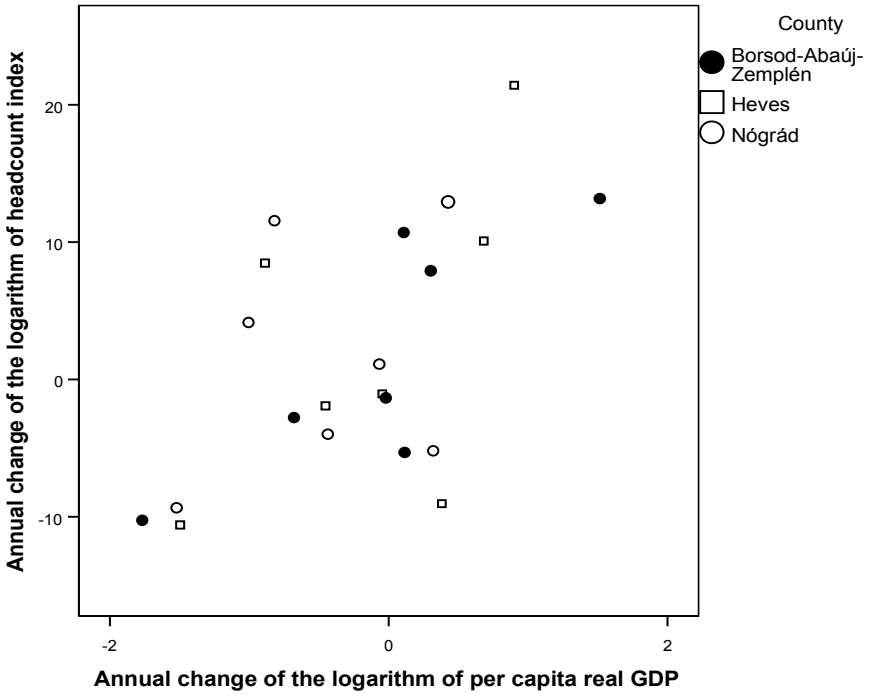

Figure 4: Relationship between economic growth and poverty (applying headcount index as measure of poverty and per capita real GDP as measure of economic growth)
Source: own compilation

As for the relationship between per capita real GDP and poverty gap ratio (figure 5), the two third of the observations (20 out of 30) can be found in the upper right and lower left quarters, which illustrate a positive relationship. Based on the visualised relationship between economic growth and poverty, the relationship seems to be direct.
When economic growth is measured with per capita real income, the relationship between economic growth and the poverty headcount index is hard to determine (figure 6). Nearly half of the observations (11 out of 21) can be found in the lower right corner, while the other half (10 out of 21) can be found in the upper right corner. In the case of the relationship between per capita real income and poverty gap ratio (figure 7), 14 observations out of 30 can be found in the lower right corner, while 16 of them are situated in the upper right corner. In the case of per capita real income, graphs are not able to outline the nature of the relationship.

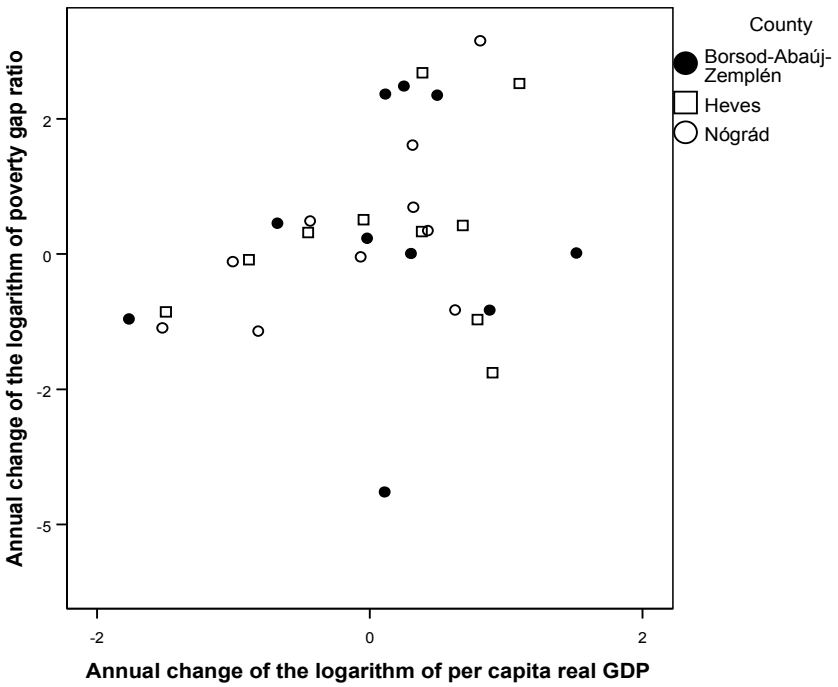

Figure 5: Relationship between economic growth and poverty (applying poverty gap ratio as measure of poverty and per capita real GDP as measure of economic growth)
Source: own compilation

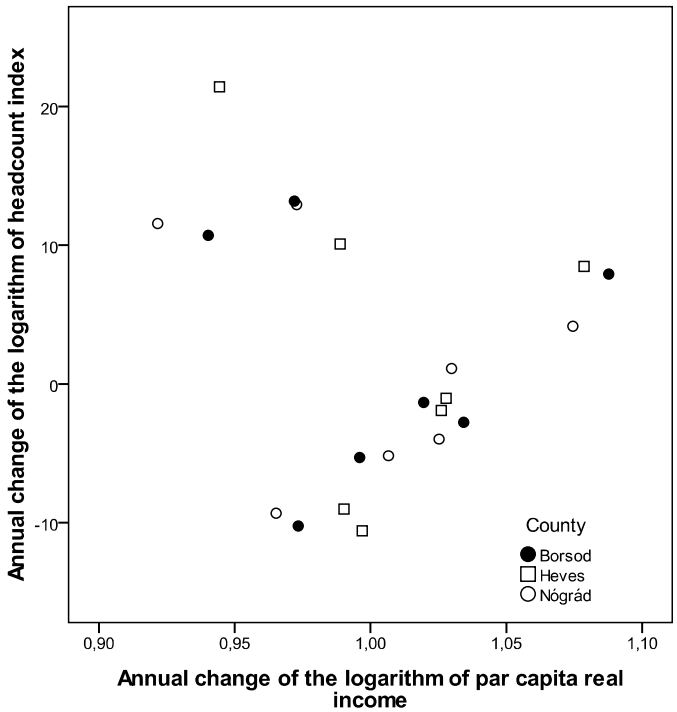

Figure 6: Relationship between economic growth and poverty (applying headcount index as measure of poverty and per capita real income as measure of economic growth)
Source: own compilation

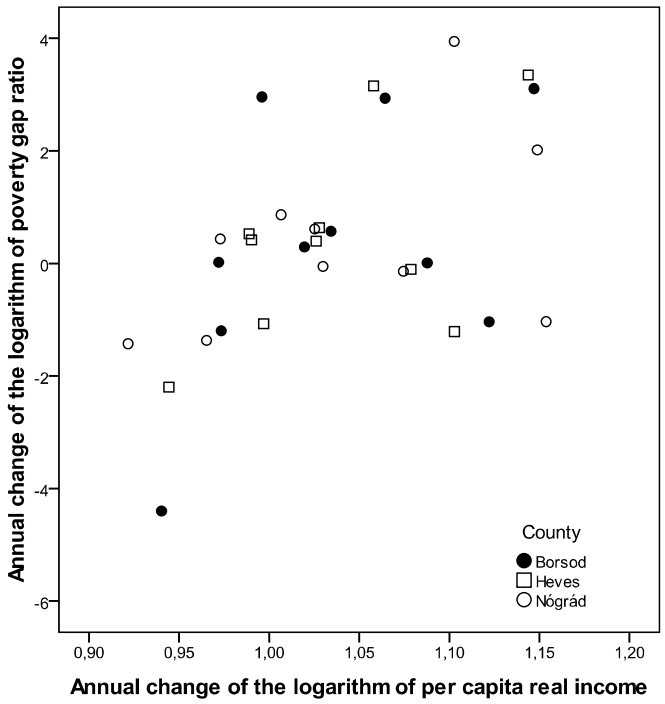

Figure 7: Relationship between economic growth and poverty (applying poverty gap ratio as measure of poverty and per capita real income as measure of economic growth)
Source: own compilation

The parameters of the regression equation can be found in table 2 and 3. The increase of per capita gross domestic product cannot decrease the headcount index and the poverty gap ratio (table 2). The results of the regression analysis do not support the relationship illustrated by the graphs.

Table 2: Economic elasticity of poverty (economic growth is measured with per capita real GDP)

Variables of poverty and coefficient of determination	*Partial regression coefficients when Y = HI (t values)*	*Partial regression coefficients when Y = PG (t values)*
Constant	61.528 (11.029)	49.405 (97.768)
Per capita real GDP	a	a
Rate of secondary school students	-318.249 (-4.907)	a
Average GDP of surrounding counties	-0.004 (-6.397)	a
R^2	*0.772*	*0.000*
Sample size	*21*	*30*

a The effect of the given variable is not significant.
Source: own computation

When economic growth is measured by per capita real income, the result of the regression analysis is the same. Per capita real income does not have any effect either on headcount index or on poverty gap ratio controlling for human development and spatial autocorrelation (table 3).
A one thousand forint increase in per capita real GDP of the surrounding counties decreases the poverty headcount index by 4 percent. Human development, measured by EDUC can also decrease headcount index significantly.

Explanatory variables account for 77.2 percent of the variation of the dependent variables. When relative poverty gap is the dependent variable, none of the explanatory variables has a significant effect on it.

Table 3: Economic elasticity of poverty (economic growth is measured with per capita real income)

Variables of poverty and coefficient of determination	*Partial regression coefficients when Y = HI (t values)*	*Partial regression coefficients when Y = PG (t values)*
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Sample size	*21*	*30*

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Source: own computation

6. CONCLUSION

In Northern Hungary, poverty is a big issue, not only in country, but also in European context. Both the headcount index and poverty gap ratio excess Hungarian and European average. As this region is economically backward, my study examines whether economic growth (or recession) has an effect on poverty and if so, what kind of effect it is.

The increase of economic growth (measured with per person real GDP or per person real income) does not have a significant effect on poverty (either on headcount index or on poverty gap ratio) therefore the first hypothesis has to be rejected. As for spatial autocorrelation, per person real GDP of the surrounding counties decreases poverty headcount index significantly. It does not have any effect on poverty gap ratio though. I fail to reject the second hypothesis, as the economic growth of the surrounding areas can decrease the rate of the poor. A one thousand forint increase in per capita real GDP of the surrounding counties decreases the poverty headcount index by 4 percent.

The fact that the economic growth of the surrounding areas can decrease poverty rate implies that economic recession that goes together with global economic crisis increases poverty along with many other unfavourable social consequences. It means that the income of more and more people falls below the poverty line and they become poor. Economic growth plays an important role in poverty alleviation as the growth of real GDP decreases the extent of poverty.

An interesting result of the analysis is that headcount index and the depth of poverty are not affected by the economic growth of the given area. It is possible that the effect of economic growth on the depth of poverty is delayed though. Research works about the number of job seekers on the labour market support this hypothesis (Lőcsei 2010). It implies that the poverty gap ratio increases only some years later. To test this hypothesis, further research and longer time series are necessary.

Result of the analysis about Northern Hungary between 2000 and 2007 are only partly supported by the current analysis. The different results are probably due to the different concepts of poverty. While the previous study is based on the absolute concept of poverty, and poverty line is defined by the existence minimum, this study uses relative concept of poverty (in accordance with the recommendations of the European Union) and defines poverty line as the 60 percent of the median income. The other possible reason for the different results is the economic crisis that started after the end of the previous study about Northern Hungary.

In Northern Hungary, economic growth is currently not enough to reduce the depth of poverty. Other means are also necessary to improve the conditions of those living in poverty. It raises the necessity of the state help as well.

BIOGRAPHY

Eszter Siposne Nandori is an economist and sociologist. She works as an assistant professor at the Institute of World and Regional Economics, University of Miskolc, Hungary. She spent an academic year in the USA as a visiting researcher with Fulbright fellowship. She had her PhD in 2011. Her dissertation is about the relationship between poverty and economic growth in transitional countries after 1990. Besides, she carries out research about subjective poverty and its relationship with objective poverty. Her research field also includes spatial analysis of poverty and social exclusion.

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